

A NEW SPECIES OF *BABINKA* (BIVALVIA) FROM THE LOWER ORDOVICIAN OF ÖLAND, SWEDEN

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ABSTRACT. A new species of the genus *Babinka* Barrande, 1881, *Babinka oelandensis* is described from the Lower Ordovician (Upper Ontikan) of Öland, Sweden. Previously, only the type species of *Babinka*, *B. prima* Barrande, 1881, was known from the Barrandian area, Central Bohemia, and the Montagne Noire region in southern France.

WHILE examining a collection of Ordovician bivalves from Öland, Sweden, on loan from the State Museum of Natural History, Stockholm (subsequently abbreviated SMNH when referring to specimens), I recognized five specimens which seem to belong to the genus *Babinka* Barrande, 1881.

The specimens come from the old collections of the museum and unfortunately the stratigraphic position is not known with certainty. In 1948 and 1949 members of the Palaeontological Institute of the University of Uppsala, led by Dr. Harry Mutvei, made a detailed study of some Ordovician outcrops on Öland. During this survey, specimens of bivalves from accurately located horizons were collected but unfortunately no specimens of *Babinka* were among these. During a visit to the Musée National d'Histoire Naturelle in Paris in 1967, I found in the collections of l'Institut de Paléontologie a specimen from Cessenon, Montagne Noire region which appears to be *Babinka prima*. As the specimen has not previously been figured and as it is much better preserved than those figured from the same region by Thoräl (1935), it is added here for comparison with the specimens from Öland.

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Genus *BABINKA* Barrande, 1881

Type species. *Babinka prima* Barrande, 1881; by monotypy.

Remarks. Only the type species *B. prima* was previously known. It is recorded from the Šárka beds (of Llanvirn age, see Havlíček and Vaněk, 1966) of the Barrandian area, central Bohemia, and from the Montagne Noire region, southern France (Thoräl, 1935; Dean, 1966). According to Dean, Thoräl's material probably came from Lower Arenig strata. One specimen in the Museum in Paris referred by me to *B. prima* (Pl. 34, figs. 6, 7, 8), is labelled 'Schistes de Boutory', Cessenon (Le Foulon), département de l'Herault. According to W. T. Dean (personal communication) this specimen is almost certainly

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from what Dean calls the Couches de Landeyran inférieures in his paper of 1966. These beds belong to the *extensus* zone of the Arenig series. Dean (1966) has a record of *B. prima?* from the Couches du Landeyran supérieures which is the horizon overlying the Couches inférieures but is still of *extensus* zone age.

The Bohemian material has been restudied by McAlester (1965) who also confirmed the identification of Thoräl's material.

Babinka oelandensis sp. nov.

Plate 34, figs. 1-5

Holotype. SMNH Mo13869, internal mould with some shell attached.

Type locality and horizon. Hälludden, Öland, Sweden. Probably *Expansus* Limestone, Upper Arenig (Hunderum substage B_{III}^α).

Material. Hälludden, Öland, 4 specimens: SMNH Mo13869, Mo13876, Mo13929, Mo13937. Hunderum, Öland, 1 specimen: SMNH Mo13861.

Description. Shell of medium size, ellipsoidal, equivalve, extended slightly anteriorly, apparently closed. Beaks small, prosogyral, placed in the middle of the dorsal margin. Lunule short, pear-shaped, bordered by distinct ridges. Ligamental area flattened, on the internal mould bordered by two distinct keels. Ligament not observed. Anterior dorsal margin describes a slight curve; posterior dorsal margin slanting, almost straight; ventral margin evenly rounded. Sculpture consists of fine concentric growth lines and very fine radial elements.

Adductor scars prominent. Between the anterior and posterior adductor is a row of approximately 8 small, pedal scars which are irregular and often undifferentiated. The anterior pedal muscle scars are more dorsally placed than the posterior ones so that the row of scars represent a slanting curve. Below the pedal scars is a row of approximately 8 very small scars which are most clearly seen on the holotype (Pl. 34, fig. 1).

Pallial line distinct, non-sinuate; below the actual line there is a 2-3 mm. wide sulcus on the internal mould. Hinge and teeth not well displayed but grooves in the internal mould suggest a bidental hinge.

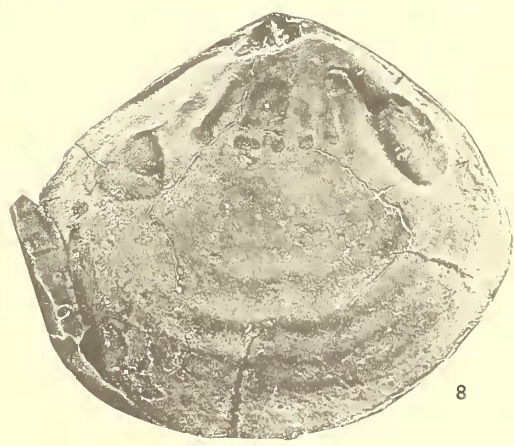
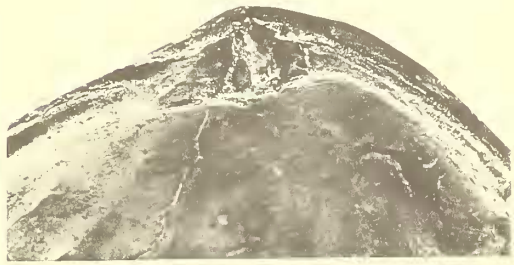
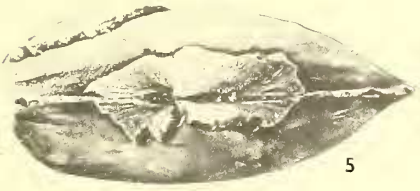
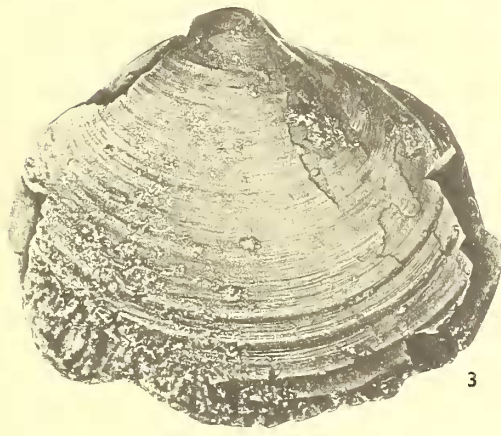
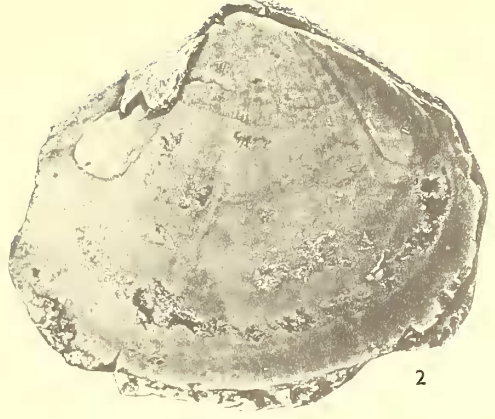
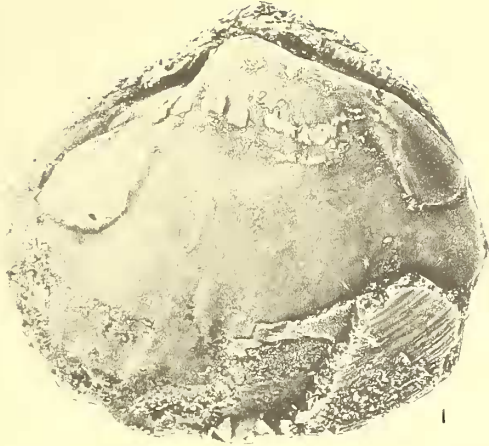
Measurements of the holotype. Length 24.0 mm.; height 20.0 mm.; diameter 9.0 mm.

EXPLANATION OF PLATE 34

Figs. 1-5. *Babinka oelandensis* sp. nov. 1, Holotype. SMNH Mo13869, lateral view of internal mould of left valve showing muscle scars. Length of specimen 24.0 mm., $\times 2.7$. 2, SMNH Mo13929, lateral view of internal mould of left valve. Length of specimen 24.0 mm., $\times 2.7$. 3, Same specimen as fig. 2, lateral view of the exterior of the right valve, $\times 2.7$. 4, SMNH Mo13879, lateral view of internal mould of left valve. Length of specimen 20.5 mm., $\times 2.7$. 5, SMNH Mo13937, dorsal view showing lunule and escutcheon. Length of specimen c. 17.0 mm., $\times 3.5$. All specimens from ?*Expansus* limestone, Hälludden, Öland, Sweden.

Figs. 6-8. *Babinka prima* Barrande, 1881. Musée de Paris, B. 995. 6, Silicon-rubber cast of right valve showing the hinge, $\times 5$. 7, Lateral view of internal mould of right valve showing muscle scars. Length of specimen 25.5 mm., $\times 2.5$. 8, Silicone-rubber cast of same specimen as fig. 7. Lateral internal view, $\times 2.5$. Couches du Landeyran inférieures, Le Foulon, Département of Hérault, S. France.

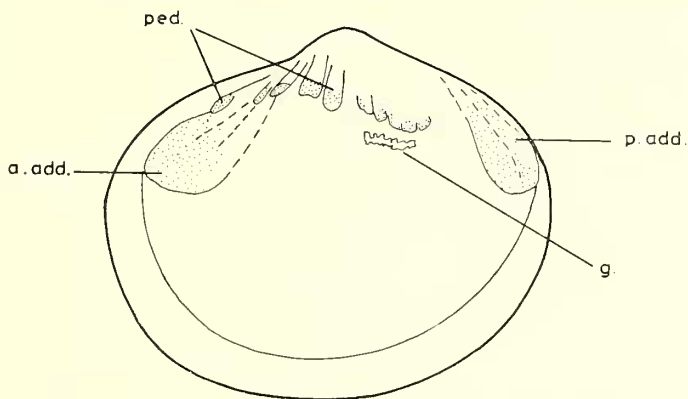
Photographs taken by Dr. David L. Bruton. Specimens painted with diluted 'Opaque' and then whitened with ammonium chloride.



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Discussion. Four of the five specimens of *Babinka oelandensis* retain part of the shell material, and it is possible to see on all of them very fine lines perpendicular to the growth-lines. These radial elements have also been observed by McAlester (1965, p. 243).

B. oelandensis differs from *B. prima* in having more prominent umbones and more distinct umbonal slopes. The pedal muscle scars in *B. oelandensis* are placed more dorsally than in *B. prima* in which they occur approximately level with the adductor scars. In the new species the pedal scars describe a slanting curve, the most anteriorly placed scars having the more dorsal position. In *B. prima* the row of pedal scars lie on a more or less straight line between the adductor scars, and are more prominent and distinct (cf. Pl. 34, figs. 7, 8). In *B. oelandensis*, however, they are not as prominent and



TEXT-FIG. 1. Sketch showing the arrangement of the muscle scars in *Babinka oelandensis* sp. nov. *a.add.* anterior adductor scar, *p.add.* posterior adductor scar, *ped.* pedal muscle scars, *g.* possible gill muscle scars.

are often undifferentiated with makes it difficult to count their number with certainty. In one specimen (Pl. 34, fig. 2) the pedal muscle scars seem to form a continuous row and give the appearance of a string of pearls. The small muscle scars below the pedal scars can be seen on two specimens (Pl. 34, figs. 1, 2). On the holotype they can only be seen below the pedal scars number 5–7 (counted from the anterior side). In one specimen of *B. prima*, McAlester (1965, p. 243, pl. 28, figs. 9–11, text-fig. 1) observed the smaller scars below the 3rd to the 7th of the pedal scars. In another specimen from Öland the small muscle scars seem to form a continuous row below the entire row of pedal scars (Pl. 34, fig. 2). McAlester (1965, p. 236) after comparison with the recent Monoplacophoran mollusc, *Neopilina galatheae* Lemche 1957, suggests that these small scars represent the site of attachment of the gills, a suggestion that seems quite feasible.

Vokes (1954) appears to have been the first to draw attention to the similarities in muscular arrangement between *Babinka* and Monoplacophoran molluscs. He concluded that *Babinka* and Monoplacophoran molluscs might be close to an ancestral molluscan type and that *Babinka* might well have occupied an ancestral position in the phylogeny of Pelecypoda as a whole. This hypothesis has later been further developed by Horný (1960) and McAlester (1964, 1965). Horný established the new order Diplacophora, for *Babinka*. McAlester (1964, 1965) came to the interesting conclusion that *Babinka* was a probable evolutionary link between the bivalve superfamily Lucinacea and some